REMARKS

This paper is responsive to an *Official Action* that issued in this case on February 22, 2008. In that *Action*, the Examiner rejected all pending claims as follows:

- Claims 10-13, 16-20, and 24-38 were rejected under 35 USC §102 as being anticipated by U.S. Pat. No. 6,654,000 to Rosenberg;
- Claims 1-4 and 6-9 were rejected under 35 USC §103 as being obvious over U.S. Pat. No. 6,470,302 to Cunningham *et al.*;
- Claim 5 was rejected under 35 USC §103 as being obvious over Cunningham *et al.* in view of Rosenberg; and
- Claims 14, 15, and 21-23 were rejected under 35 USC §103 as being obvious over Rosenberg in view of Cunningham *et al.*

Applicant amends claims 1, 24, 34, and 36, and cancels claims 25, 35, and 38. Reconsideration is respectfully requested based on the foregoing amendments and the following comments.

Rejection of Claims 10-13, 16-20 and 24-38 under § 102

A. Independent Claim 10, dependent claims 11-13, 16-18.

Claim 10 recites an apparatus comprising:

> an end effector; and
> a movable member, wherein:
> said end effector reversibly couples to said movable member to simulate a vascular access procedure; and
> said movable member moves along a linear path in response to manipulation of said end effector.

In the illustrative embodiment, the end effector is needle-catheter module (218) and the movable member is item (972). The movable member is depicted figuratively in FIG. 9 and literally in FIGs. 11B, 11C, and 11D, among other Figures.

As discussed in the description at paragraph [0078], when needle-catheter module (218) is inserted into the haptics device, the needle or catheter of the needle-catheter module couples to the movable member (972). In the illustrative embodiment, this coupling is performed magnetically, which is what makes it so simple to decouple the needle-catheter

module from the movable member. The movable member moves forward or back as a user manipulates the needle-catheter assembly into or out of the device. *See* also [0087]+

As discussed in the Background section of applicant's specification, it is typically difficult to design a haptics device in which the end effector can be de-coupled from its force-feedback system. The device described in Cunningham *et al.*, for example, is not capable of doing this. The arrangement recited in claim 10 is applicant's approach to solving this problem.

The Examiner alleges that Rosenberg teaches an end effector (laparoscopic tool (18)) and a movable member (shaft receiving portion (44)). Such characterizations are reasonable. But what is neither reasonable nor correct is the Examiner's allegation that the "movable member moves along a linear path (in-and-out) in response to manipulation of said end effector." Clearly, it does not.

It is evident from FIGs. 2, 4, and 5 that shaft-receiving portion (44), along with the rest of gimbal apparatus (25), is capable of *rotation* around axis A_1 and axis A_2. It is also evident that shaft receiving portion (44) is **NOT** capable of linear movement. As depicted in FIG. 2, shaft receiving portion (44) is pinned in position to legs (42A) and (42B) of U shaped base portion (38) by two pivots 48a and 48b (48b is not shown in the drawing). And the base portion (38) is rotatably coupled to support (34). The ONLY thing that moves in linear fashion is the end effector!

As a consequence, the Examiner is requested to withdraw the Section 102 rejection of claim 10 and of claims 11-13 and 16-18 dependent thereon.

B. Independent Claim 19, dependent claim 20.

> An apparatus comprising a receiver for an end effector, wherein said receiver comprises:
>
> a frame;
>
> an arrangement for providing two orthogonal axes of rotation for said frame, wherein said frame is coupled to said arrangement; and
>
> a movable member, wherein:
>
> said movable member receives an end effector during a vascular access procedure;
>
> said movable member moves along a linear path in a region defined by said frame; and
>
> said linear path intersects said two orthogonal axes of rotation of said frame.

Claim 19 is allowable over Rosenberg for at least the same reason as claim 10 is allowable over Rosenberg. That is, Rosenberg does not disclose a movable member that receives an end effector during a vascular access procedure, where the movable member moves along a linear path.

The Examiner is requested to withdraw the Section 102 rejection of claim 19 and claim 20 dependent thereon.

C. Independent Claim 24, dependent claims 25-33.

Amended claim 24 recites an apparatus comprising:

> pseudo skin; and
> a receiver for coupling to an end effector, wherein:
> a magnetic force is used for coupling said end effector to said receiver;
> said receiver is disposed beneath and at least partially covered by said pseudo skin; and
> said receiver has no offset degrees of freedom.

Claim 24 has been amended by incorporating the limitation of claim 25 concerning the magnetic coupling between the end effector and the receiver.

As previously noted, and as explicitly claimed in amended claim 24, the receiver (226) (*see, e.g.*, FIGs. 10A, 10B, 10C) and end effector reversibly couple to one another via a magnetic force (*see* FIG. 12, call-out "973" and paragraph [0086]). This is not disclosed by Rosenberg. The passage cited by the Examiner in the rejection of claim 25, now cancelled, simply states that some of transducers that Rosenberg uses might include "magnetic particle brakes."

In Rosenberg, the end effector does not magnetically couple to anything. The Rosenberg device uses a very different structural approach than applicant to implement force feedback, which impacts a variety of other aspects of the design, such as the applicant's use of the movable member, *etc.*

As such, claim 24, and claims 26-33 dependent thereon, are not anticipated by Rosenberg. The Examiner is therefore requested to withdraw the Section 102 rejections of these claims.

D. Independent Claim 34, dependent claim 36.

Independent claim 34 recites an apparatus comprising:

> pseudo skin; and
>
> a receiver for coupling to an end effector, wherein said receiver is disposed beneath and at least partially covered by said pseudo skin, and further wherein said receiver comprises:
>
> a force-feedback assembly; and
>
> a movable member that is free to move independently of surrounding structure, but only along a linear path, wherein:
>
> (a) said movable member is coupled to said force-feedback assembly;
>
> (b) said end effector removably couples to said movable member; and
>
> (c) when said movable member is coupled to said end effector, movement of said end effector causes said movable member to move.

Rosenberg does not disclose a movable member that:

- Moves along a linear path; and
- Is coupled to a force feedback assembly; and
- Removably couples to an end effector; and
- Moves when the end effector moves.

Therefore, the Section 102 rejection of claim 34, and claim 36 dependent thereon, over Rosenberg should be withdrawn.

Rejection of Claims 1-4 and 6-9 under Section 103

Amended claim 1 recites:

> An apparatus comprising a receiver, wherein:
>
> said receiver has three degrees of freedom that enable said receiver to move in three different ways about three different axes, wherein axes of said three degrees of freedom intersect; and
>
> said receiver receives an end effector, wherein said end effector removably couples to said receiver.

FIGs. 10A, 10B, and 10C depict receiver (226). FIG. 10A depicts the three degrees of freedom as movement with respect to three different axes of the receiver: Axis 1-1 (linear movement), Axis 2-2 (rotational movement), and Axis 3-3 (rotational movement). There are no other ways in which receiver (226) moves. FIG. 10B depicts movement about Axis 2-2, which is movement along curve B-B. FIG. 10C depicts movement along Axis 1-1, which movement along line A-A. FIG. 10C also depicts movement about Axis 3-3, which is movement along curve C-C.

These three Figures also show that the three axes of the degrees of freedom intersect. Axis 1-1 and Axis 2-2 lie in the same plane, and Axis 3-3 intersects both Axis 1-1 and Axis 2-2.

In the device disclosed in Cunningham *et al.*, the axes of the three degrees of freedom DO NOT intersect. In fact, one axis is offset from the other. This was explained in extraordinary detail in applicant's last amendment. Perhaps a drawing will help:

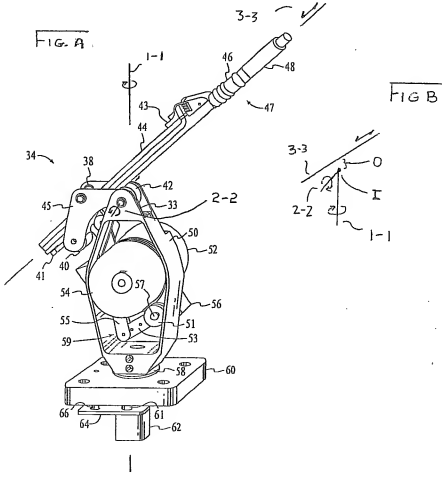

FIG. A, above, is a reproduction of FIG. 1 from Cunningham *et al.*, with some annotations regarding the three degrees of movement or freedom. A first degree of freedom is rotation about axis 1-1. This is referred to as "yaw." It permits receiver (44) to swivel (*i.e.*, to move "left" or "right"). A second degree of freedom is a rotation about axis 2-2. This is referred to as "pitch." It permits receiver (44) to move "up" or "down." A third degree of freedom is along axis 3-3. This is referred to as "translation." It permits receiver (44) to be partially inserted or withdrawn in linear type motion.

These three axes are reproduced in FIG. B to demonstrate the nature of the offset of one of the degrees of freedom. In particular, translational axis 3-3 is offset from the intersection of axes 1-1 and 2-2 by an amount "O." This amount corresponds to half the thickness of shaft (44) and half the thickness of bearing 42. In other words, shaft (44) would have to go right through bearing (42) to avoid any offset. Clearly, this is not possible in the Cunningham *et al.* design.

Although the Rosenberg states that the mechanism described therein provides four degrees of freedom, the "receiver" or the "gimbal mechanism (36)" itself has only two degrees of freedom of movement. Specifically, gimbal mechanism (36) can: (1) rotate about axis A_1 (yaw) and (2) rotate about axis A_2 (pitch). (*See*, FIG. 2.) The other two degrees of freedom permitted by gimbal mechanism (36) are actually movement of shaft (28) of the laparoscopic tool. As Rosenberg discloses at col. 9, lines 16-46:

4^{th} degree of freedom: rotation of handle (26) of laparoscopic tool (18) about axis A_0.

2^{nd} degree of freedom: rotation of laparoscopic tool (18) about axis A_2.

1^{st} degree of freedom: rotation of laparoscopic tool (18) about axis A_1.

3^{rd} degree of freedom: translation of laparoscopic tool (18) along axis A_0.

It should be clear that the third and fourth degree of freedom pertain to movement of the laparoscopic tool, not the gimbal mechanism (36).

As such, neither Rosenberg nor Cunningham *et al.* disclose an apparatus wherein the receiver has three degrees of freedom that enable said receiver to move in three different ways about three different axes, wherein axes of the three degrees of freedom intersect.

Furthermore, as noted in the applicant's previous amendment, in the Cunningham *et al.* device, the end effector (shaft 44) does NOT removably couple to the receiver. It remains attached.

In view of the foregoing, claim 1, and claims 2-4 and 6-9 dependent thereon are not obvious over the combination of Rosenberg and Cunningham *et al.* The Examiner is therefore requested to withdraw the rejection of these claims.

Rejection of Claim 5
under Section 103

Since claim 5 is dependent upon claim 1, which has already been shown to be allowable over the combination of Rosenberg and Cunningham *et al.*, claim 5 is therefore allowable.

Rejection of Claims 14-15
and 21-23 under Section 103

These claims recite subject matter that pertains to rather detailed aspects of the applicant's design for the receiver and force-feedback mechanism. The approaches taken by Cunningham *et al.* and Rosenberg to this aspect of the design of a medical simulation device are fundamentally different from applicant's claimed invention.

Take claims 14 and 15, for example. Those claims are dependent on claim 11, which is, in turn, dependent on claim 10. The limitations of claim 10 and 11 include:

- An end effector;
- A movable member;
- The end effector reversibly couples to the movable member;
- The movable member moves along a linear path in response to manipulation of the end effector.
- The movable member is coupled to a cable.

Claim 14 adds:

> a plurality of pulleys disposed on a frame, wherein:
> said pulleys engage said cable; and
> said pulleys are arranged so that a tension in said cable aligns with said linear path along which said movable member moves.

The rather complex and sophisticated arrangement shown in FIG. 11B is an embodiment of the subject matter that is claimed in claim 14.

To reject claim 14, the Examiner argues:

1. Rosenberg discloses the apparatus of claim 11.
2. Rosenberg discloses wheels, which are pulleys without a rope or cable.
3. Cunningham *et al.* teaches a plurality of pulleys disposed on a skin traction mechanism wherein:
    (a) pulleys engage the cable (belt);
    (b) pulleys are arranged so that a tension in said cable aligns with the linear path along with said movable member moves.

Therefore, according to the Examiner, it would be obvious to include pulleys, to apply force or tension.

The Examiner has previously identified the "movable member" of Rosenberg to be shaft receiving portion (44). As applicant has previously shown, this movable member most definitely does NOT move along a linear path in response to manipulation of the end effector.

Furthermore, nowhere does Rosenberg show this movable member (44) to be coupled to a cable.

According to claim 14, a plurality of pulleys, which are disposed on a frame, engage the cable. Furthermore, the pulleys are arranged so that the tension in the cable aligns with the linear path along which the movable member moves. As disclosed in applicant's specification, this alignment ensures that a user does not experience any unrealistic torque sensations as the needle/catheter module is inserted. (*See*, para. [0094].)

The Examiner then turns to the skin traction mechanism of Cunningham *et al.*, to close the loop on the rejection. Yes, in the skin traction mechanism, pulleys engage a belt. But that has nothing whatsoever to do with applicant's claimed receiver and feedback mechanism.

With all due respect, it is, quite frankly, absurd to suggest that the skin traction mechanism of Cunningham *et al.* obviates the applicant's claimed arrangement for the movable member/feedback mechanism/*etc.*, which is essentially what is being asserted. Applicant requests that Examiner look at FIG. 2 of Rosenberg and FIG. 7 of Cunningham *et al.* and ask herself if she really believes that proper application of the patent law would obviate the mechanism depicted in FIG. 11B of applicant's patent application, as incorporated into receiver (226) as shown in FIG. 10A, in view of that prior art.

As to claim 15, in addition to the fact that neither Rosenberg nor Cunningham *et al.*, alone or in combination, discloses or suggests what is disclosed in the base claim 10, nor intervening claim 11, these references do not show a movable member that comprises a pulley, wherein the movable member is coupled to the cable via the pulley.

With respect to claims 21-23, the Examiner states that Rosenberg discloses the apparatus of claim 20, and then looks to the force feedback arrangement of Cunningham *et al.* The Examiner "connects up" the various elements of Cunningham *et al.* with applicant's claim limitations, noting, in particular, that "**movable member** (Friction wheels 84 & 85) includes a rolling-contact element (pulleys 100, 112, 115 holds a rope or cable)..."

The Examiner has previously defined the movable member in Rosenberg to be shaft receiving portion (44). As already pointed out, that element does not move along a linear path, as recited in applicant's claims. In turning to Cunningham *et al.*, the Examiner redefines the movable member to be Friction wheels 84 and 85.

Well, what about all the limitations pertaining to the movable member as recited in claim 19? They can't be ignored. Clearly, the friction wheels don't move along a linear path, nor do they receive an end effector. The Examiner is essentially arguing that since shaft receiving portion (44) is a movable member, and friction wheels (84) and (85) are a movable member, the characteristics of the "movable member" as friction wheels can be imparted to the "movable member" as shaft receiving portion. That is inappropriate.

For these reasons, it is believed that claims 14-15 and 21-23 are not obvious in view of Rosenberg and Cunningham *et al.*

Conclusion

It is believed that claims 1-24, 26-34 and 36 now presented for examination are in condition for allowance. A notice to that effect is solicited.

Respectfully,
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